He was secretary of the former society from 1889 to 1892, and afterwards vice-president. He contributed seventy-five papers to it between 1877 and 1910, which show the keen interest that he took in the improvement of the fundamental constants of astronomy. He revised Taylor's Madras Catalogue and made systematic comparisons of the Star Catalogues of Greenwich, the Cape, Washington, Cordoba, Melbourne, Hong-Kong, etc., with the object of deriving their systematic errors. He discussed the measures of the planetary diameters, and investigated the errors of the tabular orbits of Juno and Flora.

This work formed an admirable preparation for the post of superintendent of the Nautical Almanac Office, to which Dr. Downing was appointed in 1892 on the retirement of Dr. Hind. He retained this post for eighteen years, retiring early in 1910. During his tenure of office the solar and planetary tables of Newcomb and Hill replaced those of Le Verrier, the list of ephemeris stars was greatly enlarged, and Besselian coordinates were introduced into the eclipse and occultation sections, facilitating the accurate computation of these phenomena. The "Lunar Distance" tables were dropped, as practically obsolete in navigation, and their place was taken by the physical ephemerides of the sun, moon, and planets, the regular publication of which is a great convenience to observers. They were previously contributed to the Monthly Notices by Mr. Marth, and have led to an increase of our knowledge of the surface currents of Jupiter. Dr. Downing took part in the international conference of directors of ephemerides which met at Paris in 1896 to endeavour to attain uniformity in the adoption of astronomical constants: its efforts were partly successful, agreement being reached on the questions of precession, nutation, aberration, and solar parallax. He was one of the founders of the British Astronomical Association in 1890, and was its second president (1892–94). He took part in two of the eclipse expeditions organised by it—to Vadso, Lapland, in 1896, and to Plasencia, Spain, in 1900.

Dr. Downing availed himself of the publication of the Cape Photographic Durchmusterung in 1899 to investigate the distribution of stars south of the equator, for which complete homogeneous material had previously been lacking. He found that the galactic condensation of the faint stars was greater in the southern hemisphere than in the northern. In conjunction with Dr. Johnstone Stoney he calculated the perturbations of the Leonid meteors between 1866 and 1899. Their results were published too late to warn the public of the probable non-appearance of the shower in 1899, so that considerable disappointment was caused, though the result was really in accord with calculation.

Dr. Downing spent the last few years in quiet retirement, owing to failing health. His tragically sudden death on December 8 resulted from angina pectoris. He leaves a widow and daughter.

A. C. D. CROMMELIN.

NOTES.

THE death of Mrs. Garrett Anderson on December 18, at eighty-one years of age, deprives the world of a pioneer whose persistent efforts opened to women the portals of institutions having the power to confer qualifications to undertake medical practice. She was the first woman to secure a medical diploma in this country, and she lived to see a steady stream of capable women enter the door which she was chiefly the means of opening. Mrs. Garrett Anderson was born in London in 1836, and in 1860 began her medical studies with the view of obtaining an English qualification as a practitioner. No medical school of the metropolis would receive her as a student, and the Royal College of Surgeons, as well as the Royal College of Physicians, declined to allow her to sit for their examinations. She obtained, however, private tuition in anatomy and surgery, and studied at the London Hospital as a nurse; and after completing her course, was able to establish her claim to be examined by the Society of Apothecaries, which was compelled by its charter to admit to examination all persons, irrespective of sex, who presented themselves after passing through an approved course of study. She thus obtained the desired qualification of licentiate of the society, and began to practise medicine. In 1866 she opened a dispensary near Lisson Grove, Marylebone, and out of this undertaking grew the New Hospital for Women in the Euston Road, of which she remained senior physician until 1890. With Miss Jex-Blake, Mrs. Garrett Anderson endeavoured to induce the University of Edinburgh to grant medical degrees to women, but unsuccessfully. She went to France, however, and obtained the degree of doctor of medicine of the University of Paris in 1870. The refusal of the northern University to admit women to its medical schools led to the establishment of the London School of Medicine for Women, and the alliance of this school with the Royal Free Hospital completed the provision for teaching required by the General Medical Council. From its foundation in 1876 until 1898 Mrs. Garrett Anderson lectured to the students on medicine, and from 1883 to 1903 acted as dean of the school. In 1896–97 she was president of the East Anglian branch of the British Medical Association, and gave an address on "The Progress of Medicine in the Victorian Era." At Aldeburgh, Suffolk, which was her home for many years, she was elected mayor in 1908, and was the first woman to occupy such a post in England. In August last the honour of Commander of the Order of the British Empire was bestowed upon her by the King. Medical women will long cherish the memory of the pioneer to whose courage and strong character they largely owe the position now occupied by them.

THE student of natural science is continually surprised by the inaccuracies which appear when writers and artists in the general Press touch even the most elementary conceptions of the natural world in which we live. Mr. J. Reid Moir has just directed our attention to a remarkable case in a large advertisement published in various newspapers on December 4. It purports to be a reply to a question propounded in displayed type, "How did Man conquer the Dinosaurus?" and is made attractive by a sketch of a Diplodocus-like animal being attacked by primeval man. The most elementary acquaintance with geology would have assured the author that his question could never arise, because all the dinosaurs were extinct long before man appeared; and even if, presuming on little knowledge, he had mentally confused a dinosaur with a mammoth, he still made a fundamental mistake (as Mr. Moir points out) in providing the huntsman with a Neolithic implement.

It has been announced that a sum of money amounting to about 250,000*l*. has been bequeathed by the late Mr. G. F. Melville, advocate, Edinburgh, to be devoted to "the care and cure of cancer"; the benefits of the bequest do not, however, accrue until the death of certain beneficiaries under the will. The trust is to be administered by the Dean of the Faculty of Advocates, the Deputy-Keeper of the Signet, and the Master of the Merchant Company, and it is understood that the trustees have considerable discretionary powers in the choice of the methods by which the object of the testator may be best attained. No doubt the questions of provision, both for research work and for the care of patients, will be considered. In Edinburgh at present the treatment of cancer patients is carried on in the general hospitals, an arrangement which has the obvious advantage of not attaching a stigma to the sufferer from malignant disease, but as the hospital accommodation in the city has not increased with the population an addition to the available resources for treatment would be advantageous. On the research side, though isolated investigations, such as those of Russell on cancer bodies, have been carried out in Edinburgh, no organised attack has been made on the problems of cancer. In the summer of 1914, however, a scheme was being prepared for the erection, under the joint auspices of the University and of the Royal College of Physicians and the Royal College of Surgeons, of an extensive research institute in medicine as a memorial of Lister's connection with the Edinburgh School. This project the war has interfered with, but the promoters are definitely committed to carry it through whenever circumstances permit. It was part of the original plan that special provision should be made for research on cancer, so that the authorities of the Medical School have been quite alive to the necessity for initiating work on the subject.

Dr. G. P. Girdwood, emeritus professor of chemistry, McGill University, Montreal, died on October 2, in his eighty-fifth year. We are indebted to the *British Medical Journal* for the following particulars of his career. Dr. Girdwood was the son of Dr. G. F. Girdwood, and was born in London on October 22, 1832; he was educated at a private school, and later at University College and St. George's Hospital. He settled in practice in Montreal in 1864, and in the following year took the degrees of M.D., C.M. at McGill University. In 1869 Dr. Girdwood was appointed lecturer in practical chemistry in the faculty of medicine, McGill University; in 1872 he became professor of practical chemistry, and two years later professor of chemistry. When he retired from this chair in 1902 he was named emeritus professor of chemistry. He occupied a number of other important positions, among them the presidency of the Röntgen Society of America and the vice-presidency of the Canadian Branch of the Society of Chemical Industry. He was also one of the original fellows of the Royal Society of Canada. "Dr. Girdwood will be remembered as a conspicuous figure among the scientific men of Canada during the last quarter of the nineteenth century—an example of the all-round man of science that will become rarer in this age of specialisation; for, though fundamentally a chemist, he had a sound knowledge of medicine, surgery, medical jurisprudence, botany, physics, and microscopical technique, including photomicrography. The Rodgers and Girdwood method of detecting strychnine was devised by Dr. Girdwood and Dr. Rodgers, of London, and it was Dr. Girdwood also who first applied reagents for the detection of forgeries, counterfeits, and the identification of handwriting. He was one of the first to apply the stereoscopic principles to X-ray prints."

We regret to learn from the *Memorias do Instituto Oswaldo Cruz* (vol. viii., fasc. ii.) of the death of the distinguished director of the institute, Dr. Oswaldo Goncalves Cruz. After completing his course as a student of medicine in Brazil, Dr. Cruz worked for some time in the Pasteur Institute in Paris. Soon after his return to Brazil the Government decided to take measures for the improvement of the health of Rio de Janeiro, especially in regard to yellow fever, and in 1903 Dr. Cruz was appointed head of the public health department, with full powers to take all necessary measures. He prosecuted the campaign against yellow fever with scientific method and with the utmost vigour, instituting for this purpose "mosquito brigades" and allied services, comprising about 2000 men. The breeding places of *Stegomyia calopus*, the carrier of yellow fever, were abolished or screened, all infected persons were isolated, and in about three years yellow fever was stamped out in Rio. Dr. Cruz also devoted careful attention to measures for the suppression of smallpox and the plague with such success that by 1909 smallpox had almost disappeared in Rio, and there has been no case of plague for five or six years. In 1901 Dr. Cruz was appointed director of an institute for work on serum therapy; he soon enlarged the scope of the work so as to include other branches of experimental medicine, together with pathology and parasitology, and about ten years ago the present institute was built and named in his honour. He was a man of great activity and stimulating personality, and brought together a band of workers who have made his institute famous as a centre of researches of a high order. Dr. Cruz will be held in honoured remembrance for his powerful support of all phases of medical research in Brazil, and for his inestimable services in the cause of public health in Rio.

At the annual meeting of the Yorkshire Geological Society held at Leeds on December 12, Mr. T. Sheppard read a paper on "Martin Simpson and his Work." Simpson was born in 1800 and died in 1892. He spent most of his life in the Whitby district, and for more than half a century had charge of the valuable geological collections in the Whitby Museum, though for a short period he was the curator of the Yorkshire Geological Society's collection. He was one of the first workers among the Liassic rocks of Yorkshire, and considering the early date of his researches, the enormous amount of information he accumulated is remarkable, and his methods of research had a surprisingly modern air. He was the author of a number of geological memoirs, most of which are now exceedingly scarce. Mr. Sheppard exhibited a complete series of these works, which he had collected, the most important being a memoir on the "Ammonites of the Yorkshire Lias," which was published in 1843, and long ago was said to be so rare that only one copy existed. Another work, published when Simpson was eighty-four years of age, is "The Fossils of the Yorkshire Lias," in which no fewer than 743 species were enumerated and described. Simpson measured with a foot-rule the thickness of the beds in the cliffs north and south of Whitby, taking special note of the specimens peculiar to each bed—a very early example of zonal collecting.

The next meeting of the Faraday Society will be held on January 14 in the rooms of the Royal Society of Arts at 5.30 p.m., when a general discussion on the setting of cements and plasters will be opened by Dr. C. H. Desch.

We regret to note that *Engineering* for December 14 records the death on December 9 of Mr. Wm. M. Urie. Mr. Urie was born in 1850, and after a varied engineering career at home and on the Continent, became works manager of the Caledonian Railway Company's Works at St. Rollox, Glasgow. He was elected a member of the Institution of Mechanical Engineers in 1899.

WE learn from the *Chemical Trade Journal* that Mr. W. J. E. Foakes, late Chief Government Inspector of Explosives for Cape Colony, has died in London. For eleven years Mr. Foakes was chief assistant and partner with the late Dr. Dupré, chemical adviser to the Home Office. He was appointed Chief Government Inspector of Explosives for Cape Colony on the recommendation of Sir Vivian Majendie in 1898.

THE council of the Institution of Electrical Engineers has passed the following resolution, which has been transmitted to Sir Albert Stanley:—"That the council of the Institution of Electrical Engineers welcomes the Non-ferrous Metals Bill, approves its principles, and congratulates the President of the Board of Trade on its introduction. The council, representing an institution the members of which are interested so widely in the supply of non-ferrous metals, unanimously supports this measure designed to keep the control of the supply of these essential metals in British hands."

THE thirty-fifth annual meeting of the American Ornithologists' Union was held in Cambridge, Mass., on November 12–16. The following officers were elected for the ensuing year:—*President*, J. H. Sage; *Vice-Presidents*, H. W. Henshaw and Dr. Witmer Stone; *Secretary*, Dr. T. S. Palmer; and *Treasurer*, Dr. J. Dwight. Two additions were made to the list of honorary fellows, Dr. A. H. Evans and Mr. W. L. Sclater, and Dr. F. E. Beddard was elected a corresponding fellow. The next meeting, in 1918, will be held in New York City.

MANY who are acquainted with the works of Mr. Ewing Matheson will regret to hear of his death, which is announced in *Engineering* for December 14. Mr. Matheson was in his seventy-eighth year, and had been a member of the Institution of Civil Engineers since May, 1876. His books deal with civil engineering subjects, and he was a partner in the firm of Messrs. Andrew Handyside and Co., Derby, in which connection he was actively associated in all the large civil engineering undertakings successfully carried out by his firm. He took an active part in the business and municipal life of Leeds.

IT is reported in *Science* that a special board of chemists has been appointed in the United States to investigate explosives and the uses of gases in warfare and to act as advisers to the Bureau of Mines. The board will study the problem of increasing the production of materials used in the manufacture of explosives and will advise the bureau in the operation of the recently enacted law regulating the sale of explosives. The members are:—Dr. W. H. Nichols, of the General Chemical Company, New York (chairman); Prof. H. P. Talbot, head of the chemical department of the Massachusetts Institute of Technology; Mr. W. Hoskins, of Chicago, a consulting chemist; Prof. H. P. Venable, of the University of North Carolina; Prof. E. C. Franklin, of Stanford University; and Dr. C. L. Parsons, of the U.S. Bureau of Mines.

THE natural history and possibilities of the Murray River are graphically described in the *Victorian Naturalist* for August by Mr. O. W. Rosenhain. A system of irrigation canals and locks, he points out, would convert many thousands of miles, now barren waste, into fertile land. He deplores the destructiveness of the early settlers, who have destroyed millions of pounds' worth of trees, the bleached trunks of which now extend along the banks on either side as far as the eye can reach. A scheme of irrigation has actually been proposed by which immense areas all along the Murray, from Echuca to Lake Alexandria, will be converted into fertile land capable of supporting more than the whole present population of Australia. At a rough estimate, it is contended, more than 3,000,000 acres could be transformed into corn and grass land and flourishing orchards. It is to be hoped, therefore, that this work of reclamation will not be long delayed.

IN January, 1914, two young king penguins, still in the nestling-down stage, were presented to the Scottish Zoological Society. A very careful study of their moulting has been made by Prof. J. Cossar Ewart and Miss Dorothy Mackenzie, and they have placed the results of their observations on record in the Transactions of the Royal Society of Edinburgh, vol. lii., part i. (1917). So good an opportunity of studying this stage of the moulting of this species has never fallen to the lot of any previous workers, and the authors have made good use of their chance. Perhaps the most interesting item in this communication is that concerning the arrested moult, which showed signs of beginning in May, when it was four months overdue, and was not resumed until August. It then followed its normal course, but the resultant plumage was scarcely different from that of the adult—that is to say, the immature dress was skipped. A precisely similar omission was induced by changing the conditions of the environment in the case of bobolinks by Mr. W. Beebe in the New York Zoological Gardens about ten years ago. But here the change was from nuptial to nuptial plumage, instead of from the nuptial to the eclipse, or "winter," plumage. The authors, by the way, scarcely seem to have grasped the nature of these plumages, to judge from their comments thereon. Nor is their comparison between the kingfisher and the king penguin likely to be regarded by ornithologists as more happy. We cannot answer for the Neo-Lamarckians but we find it difficult to believe that such a one "might even assert that, notwithstanding the necessity to moult, birds have long been endeavouring not only to obtain as brilliant a plumage as possible, but to wear fine feathers all the year round."

WART disease of potatoes (*Chrysophlyctis endiobioticum*) has long been known in this country, but in recent years it has become much more prevalent, owing partly to the popularity of certain varieties of potatoes which are now known to be highly susceptible to the disease. Fortunately for the potato-growing industry in many parts of the country, it has been found that certain varieties of potatoes are absolutely immune. With the view of ascertaining the character of each variety in this respect, the Board of Agriculture has carried out in each of the last three years extensive field trials of varieties at Ormskirk, which is the centre of an important potato-growing district that has suffered serious losses through the ravages of the disease in recent years. A report on the three years' trials has now been published in the November issue of the *Journal of the Board of Agriculture*, and is issued separately as Food Production Leaflet No. 21. The report gives a detailed account of the trials, the results of which are of the greatest practical value. Brief notes on the chief immune varieties are appended.

THE fourteenth annual report of the West of Scotland Agricultural College comprises a series of reports on experimental work and other matters which have engaged the attention of the staff. These reports have been issued as separate bulletins during the past year, and some have already received notice here. Special interest attaches to the report by Prof. R. A. Berry on the results of experiments with cows and dairy produce, of which it is only possible to mention the studies of the variation in the character of milk throughout the lactation period, and the separate study of the changes in the composition of Cheddar cheese during ripening. A further report by Prof. Berry on "The Utilisation and Eradication of Bracken" adds very materially to previous knowledge on this important subject. Special attention must also be directed to the exhaustive report on medicinal plants by Mr. A. Hosking, to which is appended a very comprehensive list of hardy herbs, trees, and shrubs used in medicine. The concluding report by Principal Paterson on experiments in the manuring of oats is very illuminating as to the possibility of raising the average yield of oats in Scotland by the judicious use of manures. The average yield on the fully manured plots in these experiments was about 30 per cent. above that obtained on the unmanured plots, and fully 33 per cent. in advance of the average yield for Scotland.

THE first number has reached us of the *Journal of Dairy Science*. This publication, which is of American origin (Baltimore: Williams and Wilkins Co.; London: Cambridge University Press), is intended to serve as the official organ of the American Dairy Science Association, and to be the medium for scientific discussion of the problems connected with dairying. The value of such a journal, if conducted on the right lines, must be very great, for in it the higher chemical and bacterial questions can be dealt with in a manner which is scarcely possible in the publications which are at present available. The first article in the journal is the text of the address delivered at the opening of the new dairy buildings of the University of Nebraska. The subject-matter of the address is well chosen, and the striking facts brought forward by Prof. R. A. Pearson are worthy of close consideration, particularly at the present time. Messrs. R. S. Breed and W. A. Stocking write on the results of a large number of bacterial analyses of milk. Special attention is directed to the errors which arise in making the counts, and the varying results obtained by the direct and plate methods in the hands of different workers. A very full report is made by the Committee on Statistics of Milk and Cream Regulations regarding the ordinances which obtain in the cities and towns of the United States. This report is of special interest as showing on what lines those responsible for the local administration of dairy laws and regulations are working. It is to be hoped that English dairy investigators will support and contribute to this publication, for the questions they have to elucidate are largely those which concern all nations.

THE Department of Statistics of Calcutta has published vol. ii. of the agricultural statistics of India for 1914–15, which deals with the area under crops, live stock, land revenue assessment, and transfers of land in the Native States. Unfortunately, this volume is much less complete than vol. i., which dealt with British India. The total area of the Native States is given as 777,000 square miles, but agricultural statistics are available only for one-sixth of that area. Detailed statistics are given, however, of the States which furnish returns.

WE have received from the Brooklyn Institute of Arts and Science a copy of a short illustrated guide to the geographical models in the Children's Museum in Bedford Park, Brooklyn, New York. The models, which seem to number eleven, are attempts to present scenes from different lands, so chosen as to illustrate simply and in a striking way the relation of man to his surroundings. The scenes represented are in Greenland, Lapland, Antarctica, the South Seas, Central Australia, the Brazilian forests, the Sahara, East Africa, Patagonia, and the hills of Afghanistan. So far as can be judged by the photographs of the models, they are well executed, but much of their value must necessarily depend on colouring and perspective. No indication of the scale is given, but we gather that the models are life-size.

UNDER the title of "The Use of Mean Sea-level as the Datum for Elevations," Mr. E. L. Jones, of the U.S. Coast and Geodetic Survey, has collected the opinions of a number of engineers and others throughout the United States on the datum to which elevations should be referred. All agreed that mean sea-level should be chosen, and that it should be adopted without further delay. Great confusion arises in some places owing to the number of datum lines used. Thus, in Salt Lake City the corporation, the weather bureau, and the two railway companies all use different levels of reference. To facilitate the adoption of mean sea-level as the standard, Mr. Jones points out that it is essential that precise levelling should be extended over the whole of the United States. At present it is entirely inadequate, being only 1·2 miles per 100 square miles of territory. The extension of the net, as quickly as possible, would allow arbitrary data to be discarded, and would result in increased usefulness in American maps. The paper is published as No. 60 of the United States Coast and Geodetic Survey Series.

As a seismic region, the Middle Mississippi valley will always be of interest owing to the series of great earthquakes which occurred at New Madrid in the years 1811 and 1812. Since then, few years have passed without one or more slight shocks in the district, one of the strongest being that which occurred on April 9 last. This earthquake, which is briefly described by Mr. R. H. Finch in the current Bulletin of the Seismological Society of America (vol. vii., pp. 91–96), is chiefly remarkable for its extensive disturbed area. Though the damage caused by the shock was slight, the earthquake was felt over a district covering about 200,000 square miles. The author infers in consequence that the origin was deeply seated. In the same bulletin Dr. Otto Klotz makes several suggestions for the study of earthquakes in the United States. He insists on the importance of prompt publication of monthly bulletins by the numerous observatories in the country, and recommends the foundation of a central bureau in Washington. Mr. Hamlin's short paper (pp. 113–18) shows how frequently earthquakes are now occurring in southern and eastern California.

ATTENTION may be directed to a very fine geological and topographical atlas of the Gympie Goldfields by the Chief Government Geologist, recently issued by the Queensland Geological Survey. This atlas comprises thirty-six sheets, drawn to the somewhat inconvenient scale of 1/4752, or six chains to the inch, beautifully executed, and apparently worked out in elaborate detail with the utmost care. The district is one of the more important of the goldfields of Queensland, which at one time produced a good deal of alluvial gold, though more recently its output has been chiefly reef-gold, derived from veins of quartz connected genetically, it would seem, with a group of altered diabasic rocks, tuffs, etc. The geological relations of these rocks to the adjoining slates, etc., are well brought out by this series of maps.

THE Geological Survey of Egypt has just issued the third part of its catalogue of invertebrate fossils in the Cairo Museum, by M. R. Fourtau. It comprises the Cretaceous bivalved shells, and is illustrated by seven beautiful plates. As in the previous parts, M. Fourtau uses specific names in a rather wide sense, being convinced that by this means it is easier to appreciate the relationships of a fauna than by multiplying names to denote minute differences. He is also inclined to use familiar and generally adopted names, instead of adhering strictly to the law of priority. His final table, illustrating the geological and geographical distribution of the fossils, includes 170 forms, of which not more than forty-two are peculiar to the Egyptian deposits. Four fresh-water shells are, curiously, found among them. The variable shells of the oysters are especially interesting, and good drawings of these occupy most of the plates. There are parallel variations in the different species depending on the several identical conditions under which they lived. Both the Survey and the author are to be congratulated on the mass of new facts they have brought together, and on the admirable manner in which these are published.

VOL. XXXIII. of the *Compte rendu* of the Société de Physique et d'Histoire Naturelle of Geneva contains a paper by Dr. A. Schidlof on a source of error which may be present in the determination of the electronic charge by Millikan's method. When fine drops of mercury are produced by blowing a gas through the liquid, they are found immediately after production to have a density identical with that of the liquid, but after a time their apparent density decreases considerably owing to the formation of a layer of oxide or of condensed gas on the surface. Dr. Schidlof points out that the same change may occur in the oil drops used by Millikan, and considers that the numbers given by Millikan show a progressive diminution of the electronic charge as the experiments continue, which could be explained by the formation on the oil drops of mean radius $5 \cdot 10^{-4}$ cm. of a layer of thickness 10^{-6} cm., of density 0·3. He considers that the true value of the electronic charge lies between $4{\cdot}775 \times 10^{-10}$ —the value given by Millikan—and $4{\cdot}8 \times 10^{-10}$.

THE Manchester Steam Users' Association has just published its chief engineer's memorandum for 1916–17. Among other subjects discussed by Mr. C. E. Stromeyer is the action of caustic liquors on steel plates. Some rings were cut out of a solid plate, and were bored with a tapering hole; others had a tapering outside, and were forced into the first set of rings so that the external rings were under tension and the internal rings under compression. After treatment in a caustic-soda evaporator, the rings were cut up into small segments, and of each ring one short piece was bent inwards and the other outwards. The results were very consistent. All those which were in a compressed condition when exposed to the caustic bent double without the least sign of cracking; those under tension, when exposed to the caustic, cracked in innumerable places when bent. These cracks appeared both on the outer surface, which was in direct contact with the caustic, and on the inner surface, which was not in contact with the caustic, but was pressing hard against the compressed inner ring. Evidently, therefore, the influence of the caustic had penetrated through ¼ in. of metal. Mr. Stromeyer suggests that the action of caustic soda may have been the cause of the cracking of boiler plates in certain instances, and has also several suggestive remarks regarding the design of autoclaves used for the production of certain coal-tar dyes by treatment with strong caustic solutions. A number of autoclaves have been made from drawings found in Continental text-books, and these designs are nearly all faulty.

OUR ASTRONOMICAL COLUMN.

THE APPROACHING SHOWER OF JANUARY METEORS (QUADRANTIDS). This shower will probably reappear on the nights following January 2 and 3. The best time to observe it will probably be on the early evening of January 3. Mr. T. W. Backhouse, of Sunderland, who has devoted much attention to this meteoric system during a long period of years, concludes that the maximum will occur on the morning of January 3. At that time, however, the gibbous moon will be shining and high in the sky. On the evening of the date mentioned our satellite will not rise until between 10 and 11 p.m., and in the dark sky between about 5.30 and 7 p.m. meteors should be abundant. The radiant point at $232^\circ + 52^\circ$ (8° S. of ι Draconis) will be due north at about 8.40 p.m., at an altitude of only 14° seen from the latitude of Greenwich.

The Quadrantid shower is sometimes very rich, though its principal activity is of very brief duration, and it is seldom well observed owing to the generally clouded English skies at this particular period of the year.

OBSERVATIONS OF β LYRÆ.—A valuable series of observations of the well-known variable star, β Lyræ, has been made at Catania by A. Bemporad (*Mem. Soc. Spett. Ital.*, September–October, 1917). The principal mean results of the observations during 1911–12 are as follows:—

	Mag.	Julian day	Interval in days
First principal minimum ...	4·39	2419,227·51	
First maximum	3·54	230·575	← 3·065
Second minimum	3·87	233·65	← 3·075
Second maximum	3·54	237·35	← 3·700
Second principal minimum...	4·39	240·43	← 3·080

The total range of variation was thus 0·85 mag., and there were indications that the second maximum was brighter than the first by about 0·02 mag. While the light-curve about the principal minimum was practically symmetrical, the descent to the secondary minimum was more rapid than the rise to the succeeding maximum.

RADIAL VELOCITIES OF STAR CLUSTERS.—At the Albany meeting of the American Astronomical Society Dr. Slipher announced some important results which he has obtained relating to the radial velocities of star clusters (Journ. R.A.S., Canada, vol. xi., p. 335). The instrumental equipment was that previously employed by him, with marked success, for spiral nebulæ. Ten clusters have been observed, and the velocities range from −410 to +225 km. per sec. The mean velocity, taken without regard to sign, is 150 km. per sec. As in the case of spiral nebulæ, the high velocities observed suggest the possibility that the clusters are distinct from our own sidereal universe.

PARALLAX OF THE RING NEBULA IN LYRA.—An attempt to determine the parallax of the central star of the Lyra nebula has been made by Mr. A. van Maanen, with the aid of photographs taken with the 60-in. reflector at Mt. Wilson (*Popular Astronomy*, vol. xxv., p. 630). Nine comparison stars were utilised, and the resulting relative parallax is given as $+0{\cdot}002'' \pm 0{\cdot}005''$. The absolute parallax would be 0·004″, and as there is practically no doubt as to the association of the star and nebula, this indicates enormous dimensions for the nebula itself, namely, 330 and 250 times the diameter of the orbit of Neptune for the major and minor axes. Taking 14·1 as the visual magnitude of the central star, the above parallax leads to the low value of +7·1 for the absolute magnitude.